USGS

Patuxent Science Meeting 2004 Poster Abstract

Forest Decision Making under Uncertainty: Adaptive Management for the Conservation of Bird Populations on a National Wildlife Refuge

Clinton T. Moore and Michael J. Conroy

Decision making for the conservation of wildlife populations is complicated when responses of populations to management actions are uncertain. In particular, uncertainty implies that management trade-offs among wildlife species cannot be forecast accurately. Adaptive management, in concert with a program of monitoring, is a formal means of achieving desired management outcomes under uncertainty while retrieving information that reduces this uncertainty in future episodes of decision making. We applied principles of adaptive management in an analysis of forest management at the Piedmont National Wildlife Refuge (Georgia, USA). The primary focus of conservation at the Refuge is the recovery of a population of endangered red-cockaded woodpeckers (Picoides borealis). At the same time, managers desire to maintain suitable habitat for a host of other forest-dwelling organisms, including the wood thrush (Hylocichla mustelina). However, effects of woodpecker-oriented management on the wood thrush and woodpecker populations are not well understood, nor are growth dynamics of the forest itself. We built a hierarchical, spatially-explicit decision model in which the forest landscape and bird populations responded to silvicultural actions carried out over space and time. We expressed our uncertainty about the forest system in a set of 12 alternative parameterizations of the model. Under each alternative model, we simulated two scenarios of prescribed burning in combination with four scenarios of spatio-temporal scheduling of silvicultural treatment. Each 100-yr simulation produced three outcome measures: predicted number of active woodpecker clusters, predicted density of wood thrushes, and a composite measure of both species outcomes. For each of these responses, the simulations indicated superior management actions both for the case of certainty in any one model and for the case of complete uncertainty with respect to all models. We also ran the models over a single-year time step, in which we simulated management activities that were carried out in the winter of 2000-2001. We used the simulation results to adjust belief weights on each of the models (i.e., we reduced scientific uncertainty) by comparing model-specific predictions of woodpecker clusters against monitoring data collected in 2001. Adaptive management is a promising tool for managing bird and other populations at the Refuge, but the lack of a systematic, detailed, and computer-retrievable monitoring program at the Refuge currently impedes its application.